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IRON WARRIORS
T72-TANK COMMAND

PC
CD-ROM
SOFTWARE

BATTLEFRONT.COM
Crazy House
IDDK
Strategy First

Iron Warriors
T-72 Tank Command
Tank Combat Manual

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1. QUICK START

To get started quickly:

1. Start the game, select menu item: “Single missions”.

2. Choose one of the single missions. After clicking on the mission title with the left mouse button, a briefing and the topographic map are displayed.

3. To start the selected mission, click on “Play”.

4. After the mission loads, the player finds himself in the tank driver’s station.

5. To start moving:

- E – start the engine
- Up arrow or mouse scroll – increase fuel feed
- B – release mountain brake
- A – switch into first gear

6. Turn using Left/Right arrow key or Left/Right mouse button – left or right turn control levers (move your mouse with the pressed left or right mouse button to the left or to the right, respectively).

7. Crew positions:

- F5 – driver
- F6 – gunner
- F7 – commander
- F8 – AA machine gunner

8. At gunner position:

- S key – turn on fire control system (SUO)
- Left, Right, Up, Down arrows or X and Y axis with Left mouse button pressed – turret rotation or gun barrel up/down
- Mouse scroll or Numpad - and Numpad + - zoom out or zoom in, respectively
- B and N keys – select ammunition type
- R key – load chosen ammo type
- Enter or right mouse button – activate range finding
- Space key – main gun fire
- Q key – co-axial machine gun fire

2. MAIN FEATURES

1) Three types of tanks are available: T-34, T-55 and T-72.

2) The player can play as commander, driver and gunner.

3) Eight types of armored vehicles are featured in the game as well as artillery/guns, an engineering vehicle, a helicopter and trucks.

4) Realistic fire control system.

5) Realistic vehicle physics, vulnerability depending on armor protection, armor penetration depending on angle of shell hit, realistic damage model.

6) Realistic ballistics engine.

7) Deformable terrain with dynamic shellholes and trenches

8) Vast open spaces with visibility of more than 2 km.

9) Height differences on game maps up to 800 m.

10) Realistic 3D environment: landscape, buildings, plants, cloud shadows, lens flares, wind and much more.

11) Change of night and day.

12) More than 70 types of buildings and installations that can be destroyed or damaged.

13) More than 40 types of plants, trees and grasses that sway with the wind.

14) Dynamic weather: fog, rain, rainbows.

15) Fully destructible environment: deformable structures, buildings that can be destroyed in real time, deformable vehicles and vegetation.

16) High-quality modeling of water surfaces and vehicle flotation.

17) Mounted infantry can be transported inside trucks and APCs and on tank hulls.

18) More than 5000 polygons per vehicle, bump mapping.

19) Mission editor allows players to create and share their own scenarios.

20) LAN network game.

3. SYSTEM REQUIREMENTS

Minimum system requirements:

CPU	GHz Athlon or Pentium III
Memory	256 Mb RAM
Sound card	DirectX 9.0 compatible
Video card	GeForce 2/4MX, Radeon 7500
Hard drive	2 Gb free space
Operating system	Windows XP/2000
DirectX	9.0c

Recommended system requirements:

CPU	2.8 GHz Athlon XP or Pentium IV
Memory	512 Mb RAM
Sound card	Hardware support of DirectX 9.0 (for example, SB Audigy 5.1)
Video card	GeForce FX5600, Radeon 9600XT
Hard drive	2 Gb free space
Operating system	Windows XP SP 1
DirectX	9.0c

4. INSTALLATION

1) Make sure that more than 2 Gb of free space are available on your hard drive and that the Windows XP/2000 operating system is installed.

2) Install the latest CERTIFIED drivers for your video card after you DELETE the old drivers. Drivers can be downloaded from the card manufacturer's web site. For example, for Radeon cards visit www.ati.com, for GeForce cards check www.nvidia.com (Drivers are also available on the installation CD).

3) Install DirectX 9.0c (Available on the installation CD).

4) Install DIVX codec (Available on the installation CD).

5) Install game files into a directory on your hard drive.

6) Read the user manual. Read the section labelled "Troubleshooting" (Chapter 6) carefully!

7) Make sure you learn the game controls (page 29).

8) Start the game by going to C:\Program Files\Strategy First\IW\IW Game

9) Play the game.

5. SETTINGS

Audio, video, difficulty levels, realism and keyboard layout can be modified in the Settings section of the game menu.

Audio menu settings allow you to change the music volume, effects, speech and general volume. Video menu settings allow players to change the monitor resolution, color depth, texture and effects quality, and realism. In the realism settings menu there are three fixed difficulty levels and a user level, which means that parameters can be fine-tuned to your personal liking.

In order to fine-tune the settings, start the configuration program (Start->Programs->CrazyHouse->T-72->T-72 Configuration). The following parameters can be adjusted:

Parameter	Characteristic	Value
Video		
Adapter	Video card	
Resolution	Display resolution	
Frequency	Display frequency	
BackBuffer Mode	Display buffer mode	
DepthBuffer Mode	Depth buffer mode	
Vertex processing	Hardware processing	On/Off
Antialiasing type	Antialiasing type	
Antialiasing quality	Antialiasing quality	
Managed textures	Use managed textures	On/Off
Compressed textures	Use texture compression	On/Off
Effects		
Tracks	Draw vehicle tracks	On/Off
Horizon distance	Horizon distance, meters	
Tree shadows	Tree shadows	On/Off
Dynamic shadows	Draw shadows from vehicles	On/Off
Shadow distance	Distance at which vehicle shadows are drawn, meters	
Pillar distance	Distance at which vehicle tracks are drawn, meters	
LOD1 distance	Distance at which vehicle details are changed from level 1 to level 2, meters	
LOD2 distance	Distance at which vehicle details are changed from level 2 to level 3, meters	
Lens flare	Draw lens flares	On/Off
Grass distance	Distance at which grass is drawn, meters	
Cloud levels	Number of cloud levels	1..16
Cloud shadows	Draw cloud shadows	On/Off
Particles quantity	Number of particles	0..1
Reflections	Draw reflections on water surface	On/Off
Reflections texture size	Defines reflections texture size	64, 256, 512, 1024
FPS counter	Display frames per second	On/Off
No instrument panel	Do not display instrument panel at game start	On/Off
No voice messages	No voice messages	On/Off
Particles sorting	Particles sorting (dust, fire)	On/Off
Particles volume	Particles volume	1..16
Post processing	Use image post processing (thermal sights)	On/Off
High quality trees	Draw high quality trees	On/Off
Add dust	Draw additional smoke and dust	On/Off
Post processing texture size	Defines post-processing texture size	256, 512, 1024
Low-end video	Use low-end and high speed render (pixel shaders are not used, simple vertex shaders are used, landscape tessellation quality is decreased, people are not displayed at large distances). The mode is used for the following video cards: GF2, GF4MX, GF3, Radeon 7500, Radeon 9000, Radeon 8500)	On/Off
Hi poly grass	Use polygons instead of sprites for drawing grass. The setting can seriously impact game speed with certain video cards.	On/Off

Textures

Main	Main textures quality top/ high/ average/ low/ as is	
Transparent	Textures with translucency	
Transparent 1 bit	Textures with translucency 1 bit	
As is	Functional textures	
Effects	Effects textures	
Bump	Bump textures	
User's	User's textures	
Units	Vehicle textures	
Unit vectors	Vehicle vector textures	
Plants	Plant textures	
Grass	Grass textures	
Buildings	Building textures	
Smoke	Smoke and fire textures	
Sky	Sky textures	
Interface	Interface textures	
Font	Font textures	
Background	Background textures	

Sound

Music volume	1..100	
SFX volume	1..100	
Speech volume	1..100	
Global volume	1..100	
No sound	Sound and background music can be switched off (recommended for users with integrated sound cards on low performance systems for better game speed)	On/Off
Sound hardware acceleration	Switches on/off sound hardware acceleration (off is recommended with integrated sound cards if problems occur)	On/Off

Realism

Calculate shell hit angle	Armor damage is calculated depending on the angle of a shell hit	On/Off
Show all units on map	Show all units on the map	On/Off
Replace tank rolls over	Replaces player tank after it	On/Off
Realistic sounds inside tank	Play realistic sounds inside tank	On/Off
Own tank armor	Adjust armor thickness	1..10
Own projectile strength	Adjust penetration and destructive power of own shells	1..10
Enemy experience	Adjust enemy experience	1..10
Allied experience	Adjust allied experience	1..10
Engine stalls	Engine never stalls if off	On/Off
God mode	Invulnerability	On/Off
Realistic rangefinder	Realistic rangefinder (no range measurement in fog)	On/Off
Run over humans	Allows units to run over enemy infantry	On/Off
Damage after collisions	Enables realistic damage after collisions	On/Off
Enable ext. camera	Enables external camera	On/Off
Realistic view	Driver's viewing angle is limited as in real tank	On/Off
Enable	Enables autotransmission autotransmission	On/Off
Enable simple start	Engine simple start mode (i.e. engine starts, SUO is on, low gear is on, accelerator pedal is pressed - only release mountain brake to start moving)	On/Off
Ext. camera on	External camera on by default	On/Off
Ammo load	Increases player's tank ammo load	1 - 5
Barrel wear	Barrel wear (lower initial velocity and accuracy)	On/Off
Tracers always	Tracers always shown	On/Off
FOV scale	Viewing angle setting for driver, commander and gunner	1 - 5
Use career	Campaign mode (missions are consecutive, player's personal records are available)	On/Off
No targets table	Disable targets table	On/Off
Global realism	Detailed damage and realistic physics	On/Off
Auto FOV variation	Viewing angle depends on speed of tank	On/Off

Near ext. cam view	By default external camera is close to the tank	On/Off
Transparent objects	See through trees and other landscape objects	On/Off
Map autotrack	By default the player tank is always centered on the map	On/Off
One console	One console (instead of three) is used for all types of information (messages, mission, and target designation)	On/Off
Infinite fuel	Fuel never runs out	On/Off
Infinite shells	Ammo never runs out	On/Off
Show waypoints	Display mission waypoints	On/Off
Show targets	Display acquired targets	On/Off
Infinite battery	Infinite charge to starter battery (to start engine)	On/Off
Track repair time	Automatic repair of damaged track in seconds	10-inf
Integrated control	Integrated control of barrel and turret	On/Off
Simple damage model	Use simple damage model for player tank	On/Off
Abuse	Toggles abusive language	On/Off

6. TROUBLESHOOTING

1) The game has been tested with GeForce 4200Ti, Radeon 9000, Radeon 9200, Radeon 9600XT, Radeon 9500, Radeon 9700, GeForce FX5600, GeForce4 MX440, and Radeon 9800 video cards.

2) The game can be played with GeForce 2 or Geforce 4 MX cards but most visual effects are not available or don't work properly. Choose minimal video settings with these cards.

3) It is recommended to use Detonator 53.03 or newer drivers for nVidia chipsets and Catalyst 4.2 or newer drivers for ATI chipsets. Use CERTIFIED drivers only.

4) For best results with ATI video cards, it is recommended to set the slider to QUALITY in the driver settings of the 3D\Direct 3D section.

5) High-speed HDD and more than 512 Mb RAM are required to minimize loading time.

6) In network multiplayer mode close all running programs like WinGate. Check that the network adaptor is installed and TCP/IP protocol is properly configured.

7) If you have problems with playback of video clips in the game, install DivX codec.

8) If your computer restarts or an error message on a blue screen appears when the game is running, choose "sound: hardware acceleration" in the game settings (provided that your sound card is integrated into your motherboard).

9) Night vision mode for T-55 and T-72 tanks requires Radeon 9500 and GeForce FX5200 video cards or better. The display of thermal imaging causes loss of performance with GeForce FX5200 type video cards.

10) If the game doesn't start, check that Morgan Multimedia Stream Switch (MMSwitch) codec is not installed on your computer. If it is, uninstall it (the codec is usually installed in the Program Files directory as MMSwitch.ax file). You can simply delete the file.

7. TRAINING

7.1 Tank Driver

The tank driver's station is designed to control the tank in combat and on the march. When in combat, the driver follows the tank commander's orders. The driver's station consists of controls and control indicators. Figure 7.1 shows the view from the driver's station.

Figure 7.1 - driver station

1.Azimuth compass

2.Damage indicator

3.Speedometer

4.Tachometer

5.Engine temperature indicator

6.Fuel gauge

7.Left turn lever

8.Right turn lever

9.Brake pedal

10.Fuel feed pedal

11.Autotransmission indicator

12.Gear shift lever

7.1.1 Getting ready to move

Controls

The tank driver can use the following controls:

- Left turn lever (7)
- Right turn lever (8)
- Fuel feed pedal (10) Operates in two modes: fixed feed and flexible feed. The former fixes throttle settings in a fixed position; the latter allows for temporary adjustment on the run.
- Brake pedal (9) Operates in two modes: standard and mountain. In standard mode, the pedal must be kept depressed to maintain braking; in mountain mode, the pedal remains fixed and the brakes activated once the pedal is pressed.
- Gear shift lever (12)

Control indicators

- Speedometer (3)
- Tachometer (4)
- Engine temperature indicator (5)
- Fuel gauge (6)

To prepare the engine for starting, check the following controls and indicators:

- The fuel tank should be filled to at least 25% of maximum capacity.
- Mountain brake is on.
- Gear shift lever is in position N (Neutral).
- Engine temperature is not less than 20°C.

Starting the engine

- Turn ignition on (E key).
- Fuel feed pedal should be fixed in middle position.
- Using the fuel feed pedal, raise the engine RPM rate to between 1200-1500 RPM (depending on the tank model).

7.1.2 Driving the tank

- Horn signal (H key).
- Smoothly increase fuel feed and set the gear with the gear shift lever. The clutch is activated automatically.

1. Switching gear one up: Smoothly increase the fuel feed and use the UP arrow to shift the gear up. The clutch is activated automatically.
2. Switching gear one down: Smoothly decrease the fuel feed and use the DOWN arrow to shift the gear down. The clutch is activated automatically.
3. Driving with the autotransmission. When driving on standard road conditions, the driver can use the autotransmission. To do this, the player should press the S key (turning on the autotransmission). The autotransmission indicator will light up. Pressing the S key again turns the autotransmission mode off.
4. Driving over difficult surface conditions. Difficult surface conditions means rugged terrain, slopes, and difficult soil (sand, marsh). To increase speed, the driver should switch to a higher gear. The player needs to follow tachometer readings. If the readings decrease and won't restore after switching to a higher gear, then the player needs to switch to a lower gear.

7.1.3 Stopping

To stop the tank you need to do the following.

- Set neutral gear by successive switching to lower gears.
- Press brake pedal.
- Decrease fuel feed to minimal.
- Activate mountain brake and deactivate standard brake.

7.1.4 Emergency operation

When moving over difficult surface conditions at high gear and maximum engine RPM the engine can overheat. Engine temperature can be controlled by the tank driver using the engine temperature gauge. When the temperature rises over 110°C, the power drops and the tank will slow down. If the engine overheats the tank should be stopped, and the player needs to wait until the temperature comes down to 90° before being able to resume driving.

7.1.5 Digging equipment

Digging equipment can be installed on the T-72 only. It is used to make hull-down tank positions quickly. The tank is fitted with a throw-over blade. The blade is lowered and raised by pressing the Ctrl+D key combination. Upon activation, the blade removes layers of earth as the tank moves forward. This eventually forms a breastwork that will create a hull-down position.

7.1.6 Hydraulic and pneumatic cleaning.

The hydraulic and pneumatic cleaning system cleans the tank equipment and gun sights from dust, dirt and humidity (G key).

7.2 Gunner

The Gunner station is shown in figure 7.2.

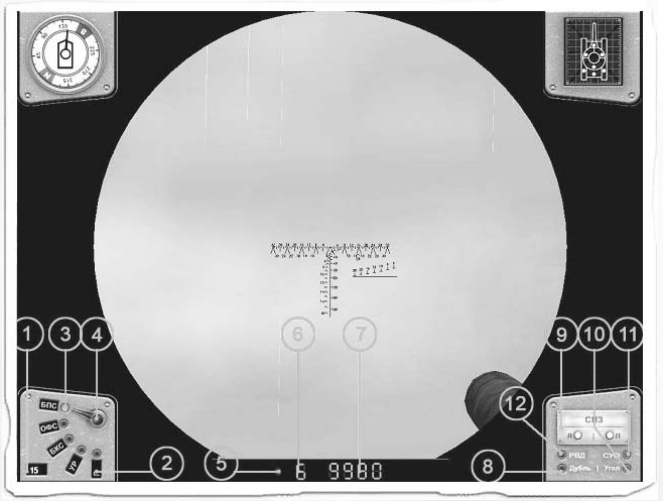


Figure 7.2 - gunner station

1.Indicates availability of chosen ammunition type.
2.Round type abbreviation
3.Indicates chosen ammo type.
4.Round selection lever.
5.Shooting readiness indicator.
6.Round type ready to fire, one letter abbreviation
7.Measured range indicator.
8.“Dual” mode indicator.
9.Smoke grenades availability indicator for the smoke screen laying system (SPZ).
10.Correct gun loading angle indicator.
11.Fire control system (SUO) indicator.
12.Manual range entry indicator (RVD).

The tank gunner can use various sighting devices in combat. Different types of sights are used in different tanks. The T-34 sight is shown in figure 7.3.

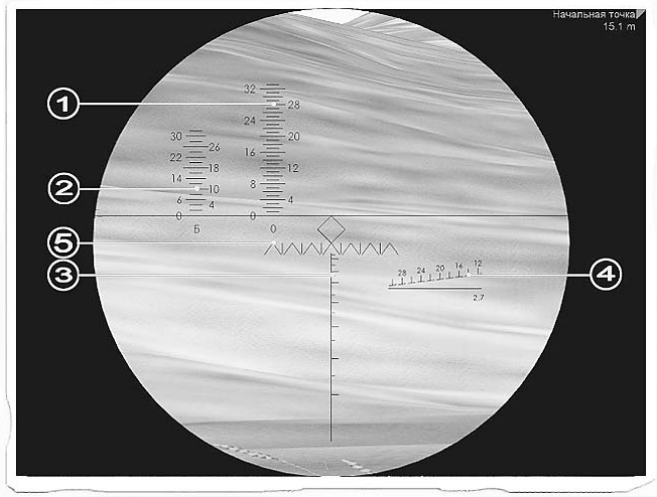


Figure 7.3 - T-34 gun sight

1.Manual range entry scale for high-explosive rounds.

2.Manual range entry scale for armor-piercing rounds.

3.Manual range entry scale for machinegun.

4.Range finding scale.

5.Lateral lead scale.

The T-55 sight is shown in figure 7.4.

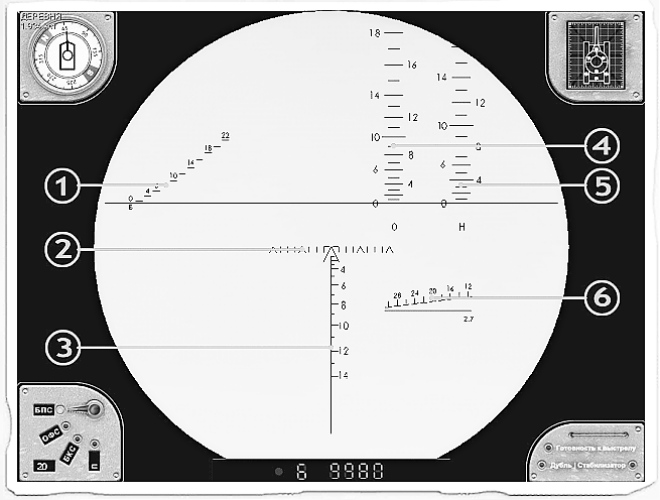


Figure 7.4 - T-55 gun sight

1.Manual range entry scale for armor-piercing rounds.

2.Lateral lead scale.

3.Manual range entry scale for machinegun.

4.Manual range entry scale for high-explosive rounds.

5.Manual range entry scale for shaped-charge rounds.

6.Target range finding scale.

The T-72 sight is shown in figure 7.5.

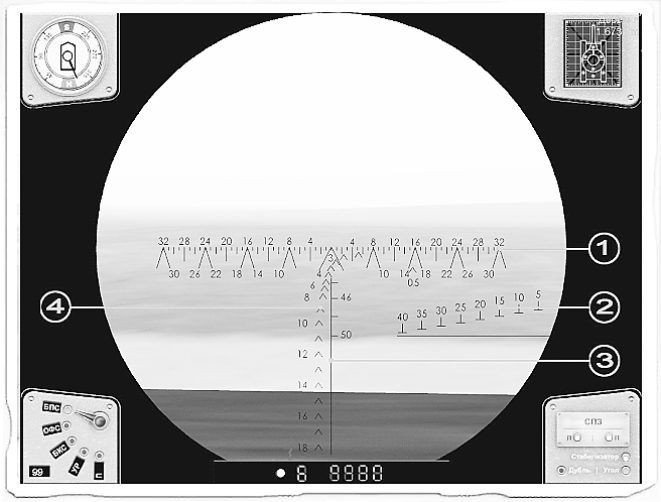


Figure 7.5 - T-72 gun sight

1.Lateral lead scale.
2.Target range finding scale.
3.Manual range entry scale for machinegun.
4.Manual range entry scale for high-explosive rounds.
5.Armor-piercing ammo scale.
6.Hollow charge ammo scale.

7.2.1 Gunner's tasks in combat

To prepare SUO (Fire control system) for combat:

- Turn SUO on (S key). Indicator shows when SUO is on.
- Check status of the following indicators and controls:

1) Range finder – 9980.

2) Check availability and amount of every type of ammo by shifting the ammo selection lever (B and N keys).

3) Check the correspondence of ballistics type to indicator readings on the range finder scale.

To acquire a target:

- Set minimal zoom.
- Search for targets by looking through the sight and moving it along the horizontal and/or vertical axis. Zoom in to identify a target.
- Define target direction using azimuth indicator.
- Report target type and azimuth to the commander.

Firing at stationary targets is executed by commander's order only.

Stationary targets are engaged as follows:

- Set the sight mark at the target indicated by commander by moving it vertically and/or horizontally.
- Set the sight zoom using mouse scroll and adjust the reticle illumination using X and Z keys to find the range.
- Select ammunition type as ordered by the commander.
- Check availability of the necessary type of ammunition and report to commander if ammo is not available.
- Find the range to the target (click right mouse button). Found range is displayed on the range finder. If the range is less than 300 m or more than 9980 m then the indicator shows 9980 m.
- Report the range to the commander.
- Load the indicated round type (R key). The corresponding indicator shows that the gun is set at the correct loading angle (for T-72 only). The shooting readiness indicator lights up if the tank is ready for shooting.
- Fire.
- Report the results of firing to the commander.

Firing at a moving target

- Set the sight mark at the target indicated by the commander by moving it vertically and/or horizontally.
- Set the sight zoom and adjust recticle illumination as needed to find the range.
- Select ammunition type as ordered by the commander.
- Find the range to the target twice within five seconds. SUO will set the necessary horizontal lead angles for the gun. If more than two range findings are made within five seconds then the horizontal lead angle will be computed using two last measurements.

- Load the indicated round type (R key). The corresponding indicator shows that the gun is set at the correct loading angle. The shooting readiness indicator lights up if the tank is ready for shooting.
- Fire.
- Report the results of firing to the commander.

Firing on the move

- Set the sight mark at the target indicated by the commander by moving it vertically and/or horizontally.
- Set the sight zoom and adjust reticle illumination if needed to find the range.
- Select ammunition type as ordered by the commander.
- Wait for commander's "Track" order (the driver slows down).
- When tank speed is at a level which allows range finding, find the range to the target twice within 5 seconds.
- Load the indicated round type (R key).
- Fire.
- Report the results of firing to the commander.

Firing guided missiles (T-72 only)

- Set ammunition type to "guided missile".
- Check availability of the necessary type of ammo and report to the commander if ammo is not available.
- Set the sight mark at the target indicated by the commander by moving it vertically and/or horizontally.
- Load the indicated round type.
- Fire.
- Keep the mark on target while the missile is in flight.
- Report the results of firing to the commander.

Firing machinegun

- Set ammunition type to "machinegun".
- Check availability of the necessary type of ammo and report to the commander if ammo is not available.
- Set the sight mark at the target indicated by the commander by moving it vertically and/or horizontally.
- Find the range to the target.
- Fire.
- Report the results of firing to the commander.

7.2.2 Emergency firing

Firing with damaged stabilizer, ballistic computer and/or range finder.

Firing at stationary targets

- Set the sight mark at the target indicated by the commander by moving it vertically and/or horizontally.
- Set the sight zoom and adjust reticle illumination if needed to find the range.
- Select ammunition type as ordered by the commander. Check availability of the necessary type of ammo and report to the commander if ammo is not available.
- Find the range to the target with the help of the range finding scale. To find the range you need to do the following:

1) Move the sight so that the bottom line of the target range finding scale lines up with the bottom edge of the target (keep in mind that the target range finding scale is designed for an average target height of 2.7 meters)

2) Move the sight horizontally until the target fits fully between the bottom line and one of the top scale marks

3) The number above the mark indicates the estimated range to the target: 5=500 meters, 10=1000 meters, 15=1500 meters, etc.

- Move the gun barrel to the correct loading angle by moving the sight view vertically. The indicator lights up when the gun is set at the correct loading angle. Load the selected round type.
- Enter the estimated range with the help of the manual range entry scale (press Ctrl+W and use PgUp and PgDn keys to select the scale corresponding to the round type). Moving manual range entry scale vertically (U and I keys), align the range mark with the sight mark. Use the bit for the purpose of aiming.
- Fire.
- Report the results of firing to the commander.

7.2.3 Smoke screen system

The smoke screen system is designed for placing a smoke screen on the battlefield. Smoke screens are required for:

- masking change of firing positions;
- masking withdrawal from the battle;
- jamming enemy's laser and infrared guidance systems.

Smoke screening is executed by commander's order. To lay a smoke screen use "<" or ">" keys, depending if you want to launch the left or right smoke grenades, respectively.

7.2.4 Night vision equipment

Night vision equipment is designed to detect the enemy in low light levels or other difficult sighting conditions. It works in the infrared spectrum and helps to see objects (people, vehicles) with a higher temperature than the environment. Such objects are displayed in bright green color in the night vision display. Figure 7.6 shows an example of a driver's night vision display.

Figure 7.6 - night vision display

7.3 Commander

The view from the commander's station is shown in figure 7.7

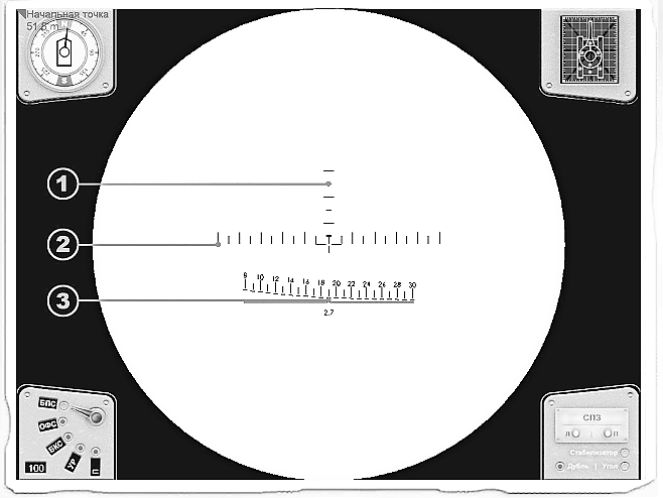


Figure 7.7 - commander's station

1.Vertical range finding scale.
2.Horizontal range finding scale.
3.Target range finding scale.

Commander's panel is identical to that of the gunner.

7.3.1. Commander s tasks

Target acquisition and identification

- Moving the sight horizontally and/or vertically, identify targets within the tank's engagement range.
- Determine the most dangerous target.
- Order the gunner to fire at the target. If the tank is on the move, order "Track" to the tank driver. The driver will slow down.
- To help the gunner find the target quickly, the commander can use target acquisition mode (T key). In this mode the turret is automatically rotated along horizontal axis at maximum rotation speed.
- Continue target acquisition.

7.3.2 Emergency operation

The “Dual” mode is selected by the commander when the gunner cannot fire. To turn the “Dual” mode on, press the D key. In “Dual” mode the commander can fire the gun from his station.

7.3.3 Choice of weapon and round type

A tank’s ammunition load consists of various types of ammunition, including high-explosive, sub-caliber armor-piercing, and hollow-charge rounds, as well as guided missiles. The choice of which type of round is loaded and fired is made by the tank commander. To destroy lightly armored and unarmored targets (as well as enemy infantry), high-explosive rounds are used.

To engage enemy armored vehicles (tanks) at a distance of up to 2000 meters, hollow charge and sub-caliber armor-piercing rounds are used.

To destroy enemy armored vehicles at a distance over 2000 meters, as well as low flying helicopters, guided missiles are used.

The anti-aircraft machinegun is used against helicopters, unarmored targets and enemy infantry.

The co-axial machinegun is used against enemy infantry and unarmored targets at a distance of up to 1000 meters.

8. CONTROLS

There are three groups of control keys as shown in the table 8.1 below.

Table 8.1 Control keys

Function	Controls
All crew positions	
Cycle combat stations	TAB
Driver station	F5
Gunner station	F6
Commander station	F7
AA machinegun	F8
External camera On/Off	F9
External camera zoom in/out	Num7, Num9
External camera left/right	Num4, Num 6
External camera up/down	Num8, Num2
External camera in default position	Num5
Map On/Off	F11
Instrument panel On/Off	BackSpace
Headlights On/Off	L
GPO (hydraulic pneumatic cleaning)	G
Menu	Esc
Turn off waypoint indication	P
Next/previous waypoint	[-OR-]
“Head to waypoint” AI driver command	~
“Stop” AI driver’s command	1
“Fire/Hold fire” AI gunner command	2
“Search On/Off” AI commander command	3
“Rotate Gun” AI gunner command	4
“Forward” AI driver command	5
“Reverse” AI driver command	6
“Turn left” AI driver command	7
“Turn right” AI driver command	8
“Turn towards target” AI driver command	9
“Find hull-down position” AI driver command	0
Switching sights next/previous	PgUp, PgDown
Open/close hatch	LCtrl+H
Screenshot	F12

Driver

Fixed throttle / fuel feed	Mouse scroll -OR- Up, Down
Throttle	X -OR- 1J
Brake	Space
Mountain brake On/Off	-OR- 5J
Controlling driver levers. (Lever away from driver - movement, towards driver - brake)	Right and left buttons take the corresponding lever. Mouse movement – lever moves forward/backward -OR- Left, Right
Switch Gears	A, Z -OR- Num+, Num-
Horn Signal	H -OR- J3
Digging blade up/down (T-72 only)	LCtrl+D -OR- J4
Ignition On/Off	E -OR- J6
Autotransmission On/Off	S

Gunner

Turret left/right	X axis with left button pressed -OR- Left, Right
Tank barrel up/ down	Y axis with right button pressed -OR- Up, Down
Select ammo type	B, N
Load ammo	R -OR- J4
Fire gun	Space -OR- J1
Fire machinegun	Q -OR- J3
SUO (Fire Control) On/Off	S
Range finding	R Mouse -OR- Enter -OR- J5
Adjust reticle illumination	X, C
Zoom in/out (sight magnification)	Mouse scroll -OR- +, -
Left smoke screen	,
Right smoke screen	.
Turn On/Off manual range input (RVD)	LCtrl+W
Manual range adjustment	U, I

Commander

Left/right turret turn	Mouse -OR- Left, Right
Barrel up/down	Mouse -OR- Up, Down
Select ammo type	B, N
Load ammo	R -OR- J4
Fire gun	Space -OR- J1
Fire machinegun	Q -OR- J3
SUO (Fire control) On/Off	S
Adjust reticle illumination	X, C
Target acquisition	T -OR- J6
Zoom in/out (sight magnification)	Mouse scroll -OR- +, -
Range finding (“Dual” mode)	R Mouse -OR- Enter -OR- J5
“Dual” mode On/Off	D
AI target designation	R Mouse

AA machinegun

Left/right turret turn	Mouse -OR- Left/Right
Barrel up/down	Mouse -OR- Up, Down
Fire	Space -OR- J1

Map

Formation	F
Defense	D
Mount into/on vehicle	I
Dismount	O
On/Off road	R
Movement	M
Speed	E
Fire/Hold fire	Space
Pause	Esc

Statistics/Reference

Screenshot	F12
Next vehicle	Left
Previous vehicle	Right
Information/Statistics	Space
Vectors On/Off	Tab
Quit	Esc
Next Vehicle	R Mouse
External camera zoom in/out	Num7, Num9
External camera left/right	Num4, Num 6
External camera up/down	Num8, Num2
External camera in default position	Num5

9. SINGLE PLAYER MODE

9.1 Campaign

The campaign consists of 18 successive single player missions. The player is a Russian volunteer fighting for the Serb National Forces. The difficulty level grows gradually from mission to mission. The main mission objectives are: protection of key installations, strikes against enemy forces over rugged terrain, and hitting key areas protected by the enemy.

To start the campaign, first you need to choose a player in the Game menu. Enter your name and press "Enter". Click on Play. The campaign mission list will appear. When a mission name is clicked, its briefing and map are displayed. To open the detailed map, move the mouse pointer to the map and press the left mouse button. Clicking on Play will load the mission.

After the mission is loaded, the mission objectives are displayed. To successfully accomplish the mission, the player needs to complete all tasks. The current status is displayed in the game menu (access via Esc key) in the "Mission tasks" submenu. Completed tasks are marked with green, open tasks are marked with red.

In the mission the player can give orders to his crew and attached units. Most missions do not require killing all enemy soldiers and vehicles. It is sufficient to destroy weapons systems, and kill key personnel like commanders and RPG gunners.

9.2 Single and training missions

You can learn and practice how to drive a tank and fire at stationary and moving targets in training missions.

Single missions also allow playing the campaign missions from the Croatian side.

9.3 Tank crew orders

The player can use the keyboard to issue the following orders to the crew of his tank:

1) "Stop" orders the AI driver to immediately stop the tank (key 1).

2) "Open/Hold Fire" – Commander AI starts target acquisition. When the target is acquired the gunner AI immediately fires to destroy it (key 2).

3) "Search On/Off" – Commander AI searches for targets (key 3).

4) "Gun backward/forward"- Gunner AI switches off SUO and turns the gun forward or to the rear (key 4). This mode can be used for moving in the city. If fire mode is active and a target is chosen this order is ignored.

5) "Forward" – Driver AI starts moving the tank forward for a distance of 500 meters (key 5). When the tank gets to this point it stops. If the order is issued again while the tank is already moving, the driver increases the speed at 10 km per hour intervals (this order can be issued repeatedly).

6) "Reverse" - Driver AI starts moving the tank backward for a distance of 100 meters (key 6) if the tank has been stopped, or decreases the speed at 10 km per hour intervals if the tank has been moving forward (this order can be issued repeatedly).

7) "Turn left" – makes a 15 degree left turn (key 7). If the tank was moving it continues moving after the turn.

8) "Turn right" - makes a 15 degrees right turn (key 8). If the tank was moving it continues moving after the turn.

9) "Turn towards target" – driver turns the tank towards the target designated by the commander (key 9). If the tank was moving it continues moving towards the target.

10) "Find hull-down position" – driver tries to find a hull-down position (key 0). If the commander has designated an active target, the driver will try to find a hull-down position relative to it, typically on the reverse slope of an elevation. If tank trenches are available within 100-150 meters, the driver will pick the closest one and drive the tank into that position.

11) "Move to waypoint" – the driver tries to move to the selected waypoint (key ~). Movement on road is preferred.

9.4 Orders to attached units.

The map mode allows the player to issue orders to the crew as well as to any attached units. Figure 9.1 shows the map interface.

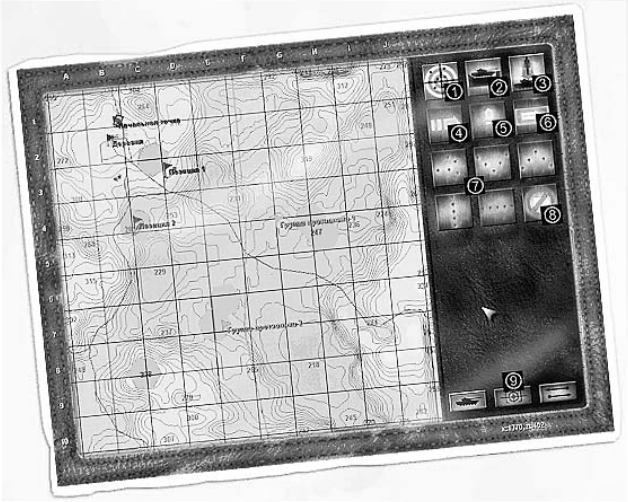


Figure 9.1 - map interface

1) “Fire/Hold fire” – player’s tank and attached units can independently fire at acquired targets and search for targets.

2) “Defense mode” – if entrenchments are available nearby, soldiers and vehicles take positions inside; otherwise, they spread out on the available terrain. Soldiers go prone.

3) “Mount/Dismount” – attached soldiers get inside their carrier (preferred) or mount on the tank.

4) “Go to specified location” – previously chosen movement, speed and other settings are taken into account.

5) “Speed” – fast/slow movement.

6) “On/Off Road” – the tank moves preferably on or off the road.

7) “Change of formation” – dispersed, line, V-formation, Wedge, column.

8) “Stop” – player’s tank and any attached units stop.

9) Interface controls (from left to right):

- track player’s vehicle (player’s tank is displayed in the middle of the screen)
- center map – center of the 2X2 km battlefield is in the middle of the map window
- zoom in / zoom out

While the mouse cursor points at a button, information about the button is displayed. The map coordinates are shown in the lower right corner. Information about the current command is displayed in the lower right corner.

The main map window displays the following information:

- Topographic information – light brown lines outlining heights. Valleys and hills are marked with black figures showing their altitude in meters above sea level. Color gradient (from white to grey) shows relative altitude of terrain (light color means higher altitude).
- Water obstacles. Light blue areas show water surfaces that can be travelled by non-amphibious vehicles; dark blue areas show the water accessible by amphibious vehicles only.
- Forests and brush are light green.
- Buildings and other structures are displayed as light yellow rectangles.
- Roads are brown and yellow stripes.
- Tank trenches and foxholes are dark red lines with intersections.

Labeled flags show the mission objectives. They are used for navigation and orientation of the player in the mission. Main objectives are red, secondary objectives are blue.

Targets on the map are designated by symbols. Dark blue color designates Croatian forces, red color designates Serb units, and neutral units are displayed in light blue. The player’s tank is pink. Destroyed weapons and dead soldiers are black. The number of tank crew members (3 or 4 depending on the type of the vehicle) is shown above the corresponding tank symbols.

10. STATISTICS

After a mission is completed, a set of statistics is displayed. The player can see information about their combat effectiveness. Figure 10.1 shows the statistics interface. The statistics window can also be accessed from the game by clicking the corresponding button in the game menu (Esc key).

Figure 10.1 - statistics screen

The menu at the top allows the player to toggle between vehicles (buttons “<<” and “>>”), receive information (button “?”), and turn hit vectors on and off (button “vectors”). Hotkeys can be used for navigation (see “Controls” section). The mouse can be used to toggle between vehicles. When the mouse cursor is pointed at a system its designation appears. Clicking the right mouse button will display the selected vehicle.

The following data can be displayed:

1) Type of tank; crew experience; player or AI controlled vehicle; mission bias (Serbs, Croats, neutrals); who destroyed this vehicle (if it was indeed destroyed).

2) Hits and damage suffered in the mission (ricochets, hits, penetrations, etc.).

3) Ammo expenditure (main gun rounds and MG bullets).

4) Hits and damage to other targets (vehicles and infantry).

5) Hit ratio – the number of shots and hits and the average ammo quantity required to destroy one target (five bullets are assumed equal to one main gun round).

6) Description of destroyed vehicles and infantry (enemy and friendly) killed.

7) List of vehicles damaged and crew losses (for armored vehicles only). The following damage types are listed:

- Engine damage
- Gun sight damage (appears even if only one sight is slightly damaged)
- Weapons damage
- Ammo damage
- Tracks damage
- Reactive armor damage (if applicable)
- SUO (Fire control system) damage
- Transmission damage
- Fuel tanks damage
- Drives damage
- Fire
- Other (non-critical damage)

Vectors are shown as thin color lines on the vehicle. The lines are encircled to show impacts from enemy shells (Figure 10.2). Hits from anti-tank rounds as well as impacts from shrapnel are marked. Vector colors are different depending on the ammo type that caused the hit (red for armor-piercing, yellow for hollow-charge, blue for high-explosives). If the armor was not penetrated, then the Vector is displayed in green color (Figure 10.3), if the vehicle was destroyed the Vector is off white (Figure 10.4). The Vector length indicates the extent of the penetration. If the armor was indeed penetrated, information about who hit the vehicle and the time of the hit is displayed at the end of the Vector. Additionally, shot distance is stated in square brackets.

Clicking “?” with the left mouse button shows which type of weapon has inflicted the damage.

Figure 10.2 - Hit vectors

Figure 10.3 - Non-penetrating hits

Figure 10.4 - Hits that destroyed the vehicle

11. FEATURED WEAPON SYSTEMS

The following weapon systems are featured in the game:

1) Tanks: T-72, T-55, T-34, “Leopard” 1A4, M50 “Super Sherman”. The player’s tanks are T-72, T-55, and T-34 (Figures 11.1 – 11.5).

2) Self-propelled guns: tank hunter SU-100 (Figure 11.6).

3) Armored vehicles and MIVs: MT-LB, BRDM-2 (Figures 11.7 – 11.8).

4) Helicopters: Mi-8 (Figure 11.9).

5) Engineer equipment: BTM-3 entrenching vehicle (Figure 11.10).

6) Artillery: BZO B-11, PTO 2A45M “Sprut-B” (Figures 11.11 – 11.12).

7) Anti-tank guided weapons and assault anti-tank weapons: self-propelled AAW – 9K113 “Shturm-S” (Figure 11.13).

8) Transport vehicles: British Army Jeep, Truck IVECO EuroCargo ML170E23, fuel truck KRAZ 265 (Figures 11.14 – 11.16).

11.1 Main Battle Tank T-72B

Designation: T-72B
Type: Main Battle Tank
Crew, men: 3
Weight, tons: 44.5
Dimensions, m: 9.53-3.46-2.23
Number of guns/caliber, mm: 1/125
Number of MGs/caliber, mm: 1/12.7, 1/7.62
Armor thickness, mm: composite + reactive armor (front), 80 + reactive armor (side)
Engine: V-84-1, diesel, 840 hp
Max. speed, kmph: 60
Cruising range, km: 500

The T-72 is the main battle tank in the inventory of Russia and most of the CIS countries. The tank was fielded in 1973 and received the designation “Ural“. New models were designed during production. The T-72A was armed with a laser sight, range finder and a night sight with an IR searchlight. Its armor was improved, and “Tucha“ smoke grenades were mounted on the turret. The T-72B was armed with a “Svir“ guided missile mount used to fire missiles with semi-automatic aiming by laser beam and a mounted dynamic protection system.

Mass production of the tank was conducted in Yugoslavia, Poland, Czechoslovakia and India. The T-72 was delivered in large quantities to Iraq, Syria, Kuwait and Algeria.

The baptism of fire for the T-72 took place during the Syrian-Israeli war in 1982. T-72s were used in the Iran-Iraq war and during the Gulf War, as well as in combat operations in Yugoslavia and in different military conflicts on the territory of the former USSR.

11.2 Medium tank T-55A

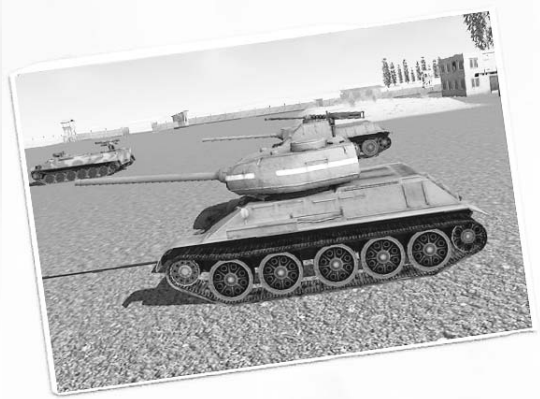
Designation: T-55
Type: Medium Tank
Crew, men: 4
Weight, tons: 36
Dimensions, m: 9.0-3.3-2.4
Number of guns/caliber, mm: 1/100
Number of MGs/caliber, mm: 2/7.62
Armor thickness, mm: 100 (front), 80 (side)
Engine: V-55, diesel, 580 hp
Max. speed, kmph: 50
Cruising range, km: 500

The most mass-produced tank in the USSR during the Cold War period, the T-55 was designed based upon the T-54B. It was distinguished from the previous model by several innovations, including: an increased ammunition load, increased engine power, increased fuel system capacity, introduction of an AA machine gun system (PAZ), enhanced night vision system and a thermal smoke screening system. In order to protect the crew from the dangers of mass-destruction weapons, an automatic tank crew protection system was implemented for the first time. Tank survivability in combat was increased due to the automatic PPO (fire-fighting) system.

The T-55M and T-55AM were designed based upon lessons learned from using T-55 tanks in the Afghanistan war in 1983. Tank combat effectiveness was increased with the primary attention paid to enhancing the tank's firepower while keeping the same level of mobility. With this aim in view a 9K116 "Bastion" guided missile system was mounted on T-55M tanks.

T-55 tanks were sold to many countries of the world and took part in numerous military conflicts in the Middle East, Indo-China, Afghanistan and during the civil war in the former Yugoslavia.

11.3 Medium tank T-34-85



Designation: T-34-85 model 1944
Type: Medium Tank
Crew, men: 5
Weight, tons: 32
Dimensions, m: 8.1-3.0-2.7
Number of guns/caliber, mm: 1/85
Number of MGs/caliber, mm: 2/7.62
Armor thickness, mm: 47 (front), 45 (side), 45 (rear), 75-90 (turret)
Engine: V-2, diesel, 500 hp
Max. speed, kmph: 55
Cruising range, km: 300

The T-34-85 was designed on the basis of the T-34 model of 1942, by installing a new cast turret with a more powerful 85 mm gun. The commander's cupola was mounted on top of the turret. Power plant, transmission and running gear remained almost without any changes. A loader was added to the crew.

A long-barrel 85 mm gun, a better sight and increased reliability allowed the T-34-85 to fight successfully against German tanks of all types. Tanks were fielded to the fighting units in Spring 1944. T-34-85 tanks took part in final combat operations of the Second World War including the defeat of Japan's Kwantun Army. These tanks made up the basis of the tank park of the Soviet Army in the first post-war years. The tanks were upgraded in the 50s.

Total number of T-34 tanks built before 1958 equaled 70,000 units. Tanks of this type were in the inventory of all armies of the Warsaw Pact countries as well as in the inventory of 28 countries in Europe, Asia, Africa and Latin America. These tanks also participated in numerous local conflicts, in the Korean war, in Vietnam, in the Middle East and in Afghanistan, and at the end of the 20th century fought in the armies of the warring parties in Yugoslavia.

11.4 MBT Leopard 1A4

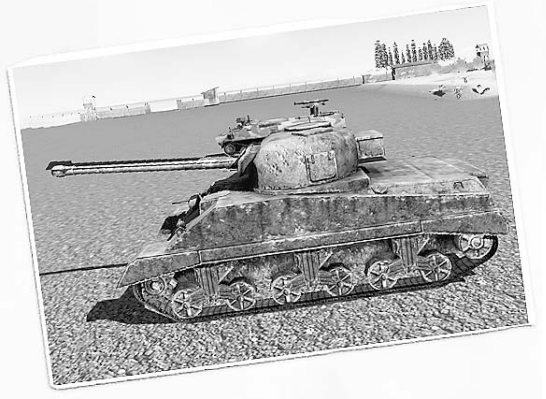
Designation: Leopard 1A5
Type: Main Battle Tank
Crew, men: 4
Weight, tons: 42
Dimensions, m: 9.54-3.37-2.76
Number of guns/caliber, mm: 1/105
Number of MGs/caliber, mm: 2/7.62
Armor thickness, mm: 70 (front), 35 (side)
Engine: MB838Ca M500, diesel, 830 hp
Max. speed, kmph: 65
Cruising range, km: 600

The first tank of this series was built in 1961. This German tank was once one of the most advanced tanks in the world.

In the early 70s a program was adopted to upgrade the tank step by step. The upgraded "Leopard" 1A1 received a two plane armament stabilizer, a heat protection cover for the gun barrel, and fording equipment. The "Leopard" 1A2 has increased turret armor and night vision sights without backlighting. The "Leopard" 1A3 is fitted with a new cast turret with multi-layer armor plate.

In 1974, the production of the "Leopard" 1A4 was started. The tank was distinguished from previous models by its advanced fire control system. A total number of approximately 4000 "Leopard" tanks of all types were built in West Germany. "Leopard" 1 tanks in the 70s were delivered to many countries of the world. Some countries purchased a license for manufacture. Tanks of this type are in the inventory of 10 countries of the world.

11.5 Medium tank M50 Super Sherman



Designation: M-50 "Supersherman"
Type: Medium Tank
Crew, men: 5
Weight, tons: 30.37
Dimensions, m: 5.84-2.62-2.74
Number of guns/caliber, mm: 1/75
Number of MGs/caliber, mm: 2/7.62
Armor thickness, mm: 51 (front), 38 (side)
Engine: Diesel, 360 hp
Max. speed, kmph: 38
Cruising range, km: 192

The "Sherman" is the best American medium tank of the Second World War. 49,234 tanks of the type were produced during the war. After the war, the USA handed over most of its "Shermans" to a dozen countries which used them in numerous conflicts.

Israelis were among those who used the tank most successfully. They managed to upgrade it significantly and created an M50 "Super Sherman" tank. It was armed with a French 75 mm gun and had a 360 hp diesel engine.

In the Middle East wars between Arab countries, the "Super Sherman" fought against Syrian T-55s, and sometimes the latter lost battles to these post-war tanks.

11.6 Tank hunter SU-100

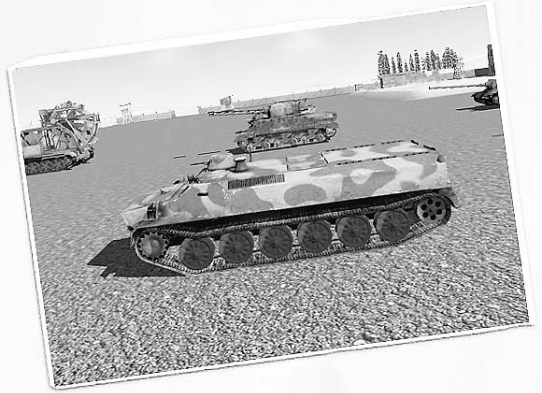
Designation: SU-100
Type: Tank hunter
Crew, men: 4
Weight, tons: 31.6
Dimensions, m: 9.45-3.0-2.24
Number of guns/caliber, mm: 1/100
Number of MGs/caliber, mm: -
Armor thickness, mm: 75 (front, 45 (side), 45 (rear), 75 (turret)
Engine: V2-34M, diesel, 520 hp
Max. speed, kmph: 50
Cruising range, km: 310

The tank hunter SU-100 armed with a 100 mm D-10S gun was designed on the chassis of the T-34-85 tank. All of the main assemblies of the tank - engine, transmission, running gear - remained the same. The hull was borrowed from the SU-85 with only slight changes. The front armor was increased from 45 to 75 mm, a commander's cupola and new observation equipment were added, two fans were installed for intensive purification of the combat compartment from powder gases.

The SU-100 was produced until March 1946 with a total number of 3037 units made. The SU-100 was one of the most effective anti-tank units up to 1948. In 1960, the SU-100 was upgraded with the installation of a new enhanced B2-34M engine, fuel pump NK-10, air cleaners VTI-3, commander observation equipment TPKU-2B and driver's night sight BVN, as well as radio sets 10RT-26E and TPU-47.

The SU-100 was produced in Czechoslovakia and was in the inventory of several African and Middle East countries. The Arabs actively used it in military conflicts with Israel.

11.7 MIV MT-LB



Designation: MTLB
Type: Armored carrier & prime mover
Crew/passengers, men: 2/11
Weight, tons: 12.2
Dimensions, m: 6.4-2.9-1.9
Number of guns/caliber, mm: -
Number of MGs/caliber, mm: 1/7.62
Armor protection from small-arms and small caliber mines
Engine: diesel, V8, 240 hp
Max. speed, kmph: 61.5/6 (amphibious)
Cruising range, km: 500

The MTLB was introduced into the inventory of the Soviet Army in 1964 as a prime-mover for anti-tank artillery and also as a carrier.

The vehicle has the following layout: transmission located in the forward part with the commanding compartment behind it. The driver sits to the left in the commanding compartment and the commander to the right. The engine is located in the middle part of the hull with a passage to the passenger compartment between it and the right side.

The armed carrier has excellent rugged-terrain performance. Swimming is achieved by track rotation.

11.8 BRDM-2

Designation: BRDM-2
Type: Recon/Scout vehicle
Crew/passengers, men: 2/3
Weight, tons: 5.6
Dimensions, m: 5.7-2.2-1.9
Number of guns/caliber, mm: -
Number of MGs/caliber, mm: 1/14.5, 1/7.62
Armor protection from small-arms and small caliber mines
Engine: GAZ-41, carburetor, 140 hp
Max. speed, kmph: 90 / 10 (amphibious)
Cruising range, km: 500

The BRDM-2 was designed by the Design Bureau of the Gorky Automobile Plant. It was introduced into the inventory of the Soviet Army in 1962, and production lasted from 1963 to 1989. The BRDM is in the inventory of the Russian Army and the armed forces of more than fifty countries around the world.

Vehicle layout - the engine and transmission are located in the rear. Commanding compartment is in the forward part of the hull with the combat compartment behind it. The vehicle has a fully enclosed air-tight hull with a welded structure made from rolled steel armor sheets. Swimming is accomplished by means of a hydraulic jet.

The BRDM-2 chassis is widely used to create various armored combat and auxiliary vehicles.

11.9 Mi-8 Helicopter

Designation: Mi-8
Type: Multi Purpose Helicopter
Crew/passengers, men: 2-3/24-28
Weight, tons: 11.1
Dimensions, m: 25.2-4.4-21.3 (main rotor diameter)
Number of guns/caliber, mm: -
Engine: TVD TV-12-117A, 2 pcs - each 1500 hp
Max. speed, kmph: 250
Cruising range, km: 690

The Mi-8 helicopter is designed to carry personnel and cargo, land marine units, provide fire support and conduct air rescue. The helicopter development was started in 1960 as a substitute for the Mi-4. The first prototype with one turbo shaft gas turbine engine made its maiden flight in June 1961. The second prototype with two engines and a five blade main rotor made its maiden flight in August 1962. 2400 units were built up to 1991 for CIS countries and approximately 2800 units for export.

The crew cabin is armored. External pylons can be mounted for carrying cargo and a winch with 150 kg carrying capability. Combat helicopters are armed with the IR jamming system “Lipa”, 12.7 mm and 7.62 mm machine-guns in the nose rotating turret and with carriers at both sides of the hull for up to six rocket launchers and up to six ATGMs on top of guiding rails. The Mi-8 is in the inventory of approximately 40 countries.

11.10 BTM-3

Designation: BTM-3
Type: Fast entrenching vehicle
Crew, men: 2
Weight, tons: 31.6
Dimensions, m:
transport mode: 7.4-3.2-.35
digging mode: 10.9-3.2-3.5

Number of guns/caliber, mm:
-
Engine: 380 hp
Max. speed, kmph: 36
0.8 (when digging)
Cruising range, km: 560

The fast trench-digging vehicle BTM-3 is designed to dig defensive and communication trenches in soils of up to IV type. The BTM consists of the basis vehicle and digging equipment. A heavy artillery prime-mover was used as the vehicle basis. When the vehicle is moving in transport mode, the gear box provides five gears for forward movement and one for backward. As soon as the vehicle starts digging trenches speed is decreased.

The BTM can dig trenches in curves with a minimum radius of 25 m. The vehicle can switch from transport mode to operating (digging) mode in 10 minutes. When digging at 3rd gear, the BTM can approximately dig an 800 meter long man-sized trench in one hour.

11.11 BZO (recoilless gun) B-11

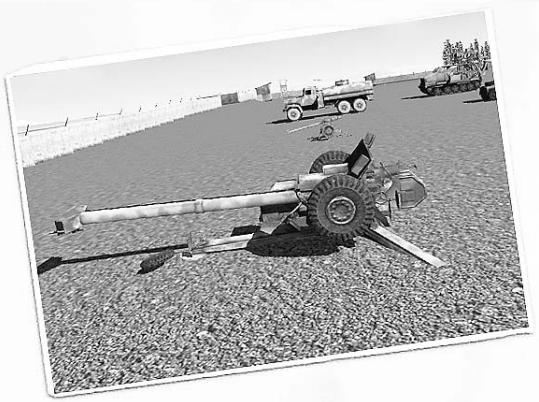
Designation: B-11
Type: Smooth-bore Recoilless Gun
Crew, men: 5
Weight, tons: 0.3
Dimensions, m: -
Effective range of fire, km:
0.45

Rate of fire, rounds per min:
5
Max. elevation angle, degrees:
-10 / +45
Number of guns/caliber, mm:
1/107

The B-11 gun is designed by the Design Bureau under guidance of B.I. Shavyrin. Its barrel consists of a smooth-bore tube, chamber, breech and breech mechanism. It is fixed on a tripod mount consisting of a frame and boom. In firing position, the gun rests on the tripod mount and the wheels are elevated above ground level. The gun is transported over long distances by means of prime-mover.

The gun can be transported in a truck body together with crew and ammo load. The gun can be also dropped by parachute.

11.12 PTO 2A45M Sprut-B



Designation: 2A45M “Sprut-B”
Type: Smooth-bore AT Gun
Crew, men: -
Weight, tons: 6.6
Dimensions, m: -
Effective range, km: 2
Rate of fire, rounds/min: 6-8
Max. elevation angle, degrees: -6 / +25
Number of guns/caliber, mm: 1/125
Engine: MeM3-967A
Max. speed, kmph: 10
Cruising range, km: 50

At the present time, the “Sprut-B” is probably the most powerful anti-tank gun in the world. The specifications for development of such an anti-tank gun with the ballistic characteristics of the 125 mm smooth-bore tank gun D-81 were set in January 1968. The “Sprut-B” gun was made by mounting a D-81 tank gun on the gun-carriage of a 122 mm D-30 howitzer, allowing all-round firing.

The gun barrel has a 51 caliber length and consists of the tube with muzzle brake connected with a jacket in its chamber part and a breech. The barrel does not have rifling which allows higher powder gas pressure in the barrel tube and imparts rather high initial speed to its round. To suppress rather significant recoil forces, the recoil length is increased from 340 mm (D-81) to 970 mm. “Sprut-B” is fitted with various sighting devices for accurate fire control.

The gun is transformed from travelling position into combat with the help of a mechanised system. The gun can be towed by “Ural4320” army trucks or by MTLB. The “Sprut-B” fires discarding cartridge rounds of the D-81 tank gun. Admissible continuous fire mode - 100 rounds per hour.

11.13 AAW-9K113 Shturm-S

Designation: 9K113 “Shturm-S”
Type: Self-propelled ATGM
Crew, men: 2
Weight, tons: 12.2
Dimensions, m: 6.4-2.9-1.9
Number of MGs/caliber, mm: 1/130 PU
Armor protection from small-arms and small caliber mines
Engine: Diesel, V8, 240 hp
Max. speed, kmph: 61.5/6 (amphibious)
Cruising range, km: 500

The “Shturm-S” self-propelled long range anti-tank guided missile (ATGM) was designed in the 70s by the Kolomna Machine Building Design Bureau. In the Soviet Army, the ATGM was adopted in anti-tank Army and Front brigades. Russian Army and armed forces of several CIS countries are using the “Shturm-S” at the present time.

The “Shturm-S” features the self-propelled launcher 9P149 with 9M114 missile. The launcher is mounted on a MTLB chassis. It is equipped with a missile guidance system and automatic loader.

The 9M114 missile is the world’s first supersonic ATGM. It is fitted with a solid fuel booster and mid-flight engine. The missile can be equipped with a high-explosive warhead to inflict losses to enemy personnel and weapon emplacements. The ATGM has a semi-automatic guidance system with command transfer via radio.

11.14 British Army Jeep

Designation: British Army Jeep
Type: Rapid insertion vehicle
Crew, men: -
Weight, tons: 3.0
Dimensions, m: 3.6-2.0-1.8
Number of guns/caliber, mm: -
Engine: Petrol, R4, 111 hp
Max. speed, kmph: 50
Cruising range, km: 130

Legendary British army jeep which has been produced for more than 50 years and supplied to more than 100 countries. Such a success is based upon simplicity, reliability and high cross-country performance. Initially developed for military purposes, it has a four-wheel drive and high road clearance.

The British Army jeep is a light army vehicle with a wide range of modifications produced for a multitude of military purposes.

11.15 IVECO EuroCargo ML170E23.

Designation: IVECO EuroCargo ML170E23
Type: Medium truck
Crew, men: -
Weight, tons: 18
Dimensions, m: 7.3-2.6-3.4
Number of guns/caliber, mm: -
Engine: Diesel, R6, 227 hp
Max. speed, kmph: 60

This Italian-produced medium truck is widely used throughout Europe, including the Balkans, mainly as a civilian truck.

Trucks are used for delivering small cargo at all distances.

11.16 Fuel truck KRAZ 265

Designation: KRAZ 265
Type: Fuel truck
Crew, men: -
Weight, tons: 21
Dimensions, m: 8.5-2.8-3.2

Number of guns/caliber, mm:
-
Engine: Diesel, V8, 240 hp
Max. speed, kmph: 60

Civilian and military six-wheeler produced in the Ukraine. This fuel truck was supplied to many Soviet republics as well as to countries in Europe and the Middle East. The truck has a frame design, a 6x4 wheel drive, a high road clearance and wide profile tires which provide excellent terrain abilities.

12. DAMAGE MODEL

Damage calculation in the game takes into account the location of all the main systems in the player's tank. The following systems can be damaged: engine and its subsystems (transmission, coolant system, etc.), tracks, sights, SUO (Fire control system), guns and automatic reload system (or loader). The crew can be injured as well: if disabled, the gunner AI stops firing, the commander AI stops scanning the terrain and issuing orders, the driver AI stops driving the tank. If the tank is fully controlled by the AI, then the crew will leave the tank after a certain extent of damage. This happens also if the tank is controlled by the player, but the amount of damage at which the tank is considered destroyed varies depending on the settings and difficulty level.

Most tanks have different armor thickness depending on location. This means that the front armor is usually thicker than lateral armor which is in turn thicker than rear armor.

A special damage indicator (figure 12.1) shows the damage level. It also shows the hit direction and current status of the various systems of the tank.

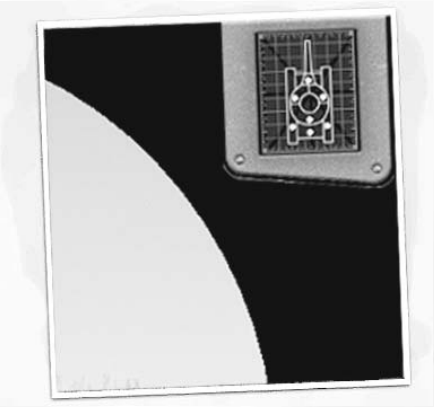


Figure 12.1 – Damage indicator

Damage is indicated by the various light diodes. The diode light color indicates the damage level as follows: white – undamaged, yellow – damaged, red – destroyed.

The top diode on the turret indicates the status of the weapon systems (machineguns and the main gun).

The bottom diode indicates the status of the engine and its subsystems.

The left diode on the turret indicates the status of the horizontal turret drive and stabilizer.

The right diode indicates the status of the vertical turret drive and stabilizer.

The lower right and left diodes on the hull indicate the status of correspondent tracks.

The bottom diode on the rear hull indicates the status of the automatic reload system (charge man) and SUO.

Broken tracks can be repaired by the crew. The time needed to repair the tracks depends on the game difficulty settings.

When a shell or bullet hits the tank a possible armor penetration is calculated. Hit angles, armor thickness, shell type/velocity and other features are all taken into account. At flat impact angles, ricochets can occur. The shell path after a penetration is also considered to determine which tank systems are damaged, and to calculate the damage level.

If the shell is high-explosive, blast wave and splinter dispersion are modeled. The blast wave can damage and destroy buildings, cut trees, make shell holes and kill nearby personnel. Lightly armored and unarmored vehicles can even be damaged or destroyed by a blast wave.

Armor-piercing shells often cause fires. Vehicles with no fire suppression system (only the T-55, the T-72 and the "Leopard" 1A4 have it) are usually ignited. With hatches closed, armor-piercing shells can kill the entire crew.

Multiple large-caliber impacts can damage tank systems even without penetration. The location of vehicle systems in the game is modelled realistically, e.g., to damage the engine of a "Leopard" 1A4 the shell should hit the rear part of the hull.

A simplified damage model is used for infantry (living or dead); no injuries or wounds are modelled.

Various damage effects occur if a tank system is hit:

- Gun sight damage – cracks appear making it harder to aim;
- chassis damage - tracks break or handicap steering;
- transmission damage – the gear is occasionally knocked out;
- loader killed or automatic reload system damaged – reload time increases substantially;
- driver killed – driver AI doesn't respond to orders, the tank stops;
- gunner killed – gunner AI stops firing;
- commander killed – commander AI stops acquiring targets;
- engine damage – engine power drops (the engine stalls at overdrive), the engine overheats or doesn't start;
- fuel system damage – fuel leaks, fire can occur;
- ammo detonation – the tank is destroyed and the crew is killed;
- fire – crew bails out to avoid burning to death;
- SUO damage – stabilizers fail (in T-72 the gun is not reloaded automatically);
- range finder damaged – range finder provides inaccurate readings or is not functioning;
- ballistic computer damaged – corrections for movement and distance are inaccurate;
- turret or gun drives damaged – the turret rotation slows down or the gun goes up/down;
- gun/machinegun damaged – no firing;
- radio damaged – no effect in the game.

13. A NOTE ABOUT REALISM

All characters, landscapes and missions in the game are fictional, but the game is developed on the basis of the real conflict in Yugoslavia in 1991-1993. Any similarities with real world events, persons or locations is pure coincidence.

All vehicles in the game are using real world data and specifications, but there are some modifications and changes.

The control panels of all tanks in the game are simplified and don't correspond to the REAL ones. It is not possible to play the loader (T-34 and T-55) and radio-operator (T-34). Ballistics modelling is realistic but not real.

The following features of the playable tank models deviate from real-world data:

1) The T-34 in the game is a Yugoslav derivative of the Soviet T-34-85. It has an additional AA machinegun, and its sight is substantially improved (variable zoom added).

2) The T-55A is fitted with improved sights, a night vision system, laser range finder and digital ballistic computer. However, it lacks a horizontal weapons stabilizer (like the early T-54 models). There is no engine smoke generating system.

3) The T-72 in the game is a T-72B model without reactive armor. In the game, the tank is fitted with improved sights and a thermal vision system as well as with digging equipment and a digital ballistic computer. In reality, the T-72 doesn't have sights with variable zoom and the aiming mark is not used for range finding.

The thermal vision sights on T-55 and T-72 tanks work properly with Radeon 9500, GeForce FX5200 video cards or better.

It is unlikely that in the real conflict in Yugoslavia the following weapon systems were employed: PTO (anti-tank gun) 2A45M "Sprut-B", AAW – 9K113 "Storm-C", SU-100.

14. NETWORK GAME

The network game mode is available in LAN. It uses DirectPlay technology. No special settings like protocol selection are required (TCP/IP protocol is always used). The number of players is limited by the number of tanks (stations) in the network mission. T-34, T-55, T-72 tanks are available. Each tank has three crew members; the commander, the gunner and the driver.

To start a network game choose "Network" in menu.

You can join a game or create your own game.

14.1 Creating a new game

After clicking "Co-op" mode the player can choose a mission for cooperative play. After choosing a mission, the player can see the map and briefing. Clicking "Play" will display a list of players. If the network game is created on the player's computer, "host" is added to his name. He needs to wait for all players to connect.

The host computer can work in dedicated server mode (the option has to be selected in menu). The computer will perform environment computation without visualization to minimize lag. This mode is RECOMMENDED for comfortable playing.

After all modes are selected and all players are connected, click the "Play" button. A list of vehicles available for the current mission will be displayed. By default all vehicles are controlled by the computer. The player can choose any station in any tank. His network name appears at the chosen station. The station can not be changed once in the game. After all stations are taken click on the "Play" button on the host computer to start the mission. This launches the game on all the connected computers as well.

Choosing "Competitive" mode the player can select a multiplayer mission for the network game. Further settings are the same as in "Co-op" mode.

14.2 Joining a network game

Click on "Join the game". A table displaying all current sessions will appear. Choose the session you would like to join and click "Join the game". The list of available vehicles will appear. Choose a station in any tank. Your network name will appear on the chosen station. The mission is launched by clicking "Play" on the host computer.

15. FAQ

Q: Why doesn t my tank fire?
A: 1) The gun is not loaded – Load with R key, 2) no ammo, 3) machinegun is selected, 4) for T-72, in order to load first the gun has to be set at the correct loading angle ("angle" indicator lights must be on). If SUO is on, this is done automatically, 5) the gun is damaged.

Q: The tank does not move even with full throttle.
A: Release the mountain brake (B key).

Q: Cannot hit target.
A: Range should be measured (right mouse button) for every round type with the SUO on (S key). If target moves then range finding is done twice within 1-2 seconds to allow the targeting computer to calculate the correct lead angle.

Q: Gunner s sight shakes when on the move so that it is impossible to aim.
A: Turn SUO on (fire control system) on (S key). The indicator lights up. No stabilizer is available for T-34.

Q: Why can I only fire armor-piercing rounds?
A: Use B and N keys to change ammunition types.

Q: I hit the enemy tank several times but nothing happens.
A: 1) to kill enemy armor it's best to hit it in the side or from the rear as it has less armor in those locations, 2) you need to make the right choice of round for every target: for tanks – armor piercing (BPS) or hollow charge (BKS), for BRDM (lightly armored reconnaissance vehicle) or MTLB – high explosive fragmentation (OFS), for helicopters – guided missile (UR), for infantry – machinegun (P).

Q: Why can t I fire from the commander s station?
A: You need to turn "Dual" mode on (D key).

Q: Why does the T-55 and T-72 engine stall in fifth or sixth gear?
A: Higher gears are designed for good roads. They can usually only be used on hard-surface roads.

Q: Why is the gunner sight blurred for a pretty long time after firing?
A: To reduce kicked up dust from firing, try to fire while on a hard surface or on grass.

Q: Why does my tank always overturn?
A: Try not to move so fast. Slow down before turning.

Q: Why does my tank start moving when I exit the driver s station and go to gunner or commander station?
A: You must have issued the order to move forward or chosen a waypoint before. Therefore the driver AI tries to follow your order. Don't forget to order the command "Stop".

Q: Why can t my attached units use the bridge to cross the river, and instead move along the river bank?
A: Choose on-road movement mode in the map.

Q: Why can t I find the correct range?
A: Turn SUO on (S key).

Q: After I quit the game to go to the menu, the game quits to Windows for several seconds and then loads the menu — why is that?
A: Because the menu and the game itself are different programs.

Q: The game won t start. What should I do?
A: Carefully read section 6 "Troubleshooting".

16. CREDITS

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Game websites:
www.strategyfirst.com
www.battlefront.com
www.battlefront.com/products/t72/
www.iddk.t72.ru
www.crazyhouse.ru

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17. LIST OF ABBREVIATIONS

AKPP	autotransmission
BZO	recoilless gun
BKS	armor-piercing hollow charge
BPS	sub-caliber armor-piercing shell
BRDM	combat reconnaissance patrol vehicle
BTM	mobile entrenching vehicle
BTR	armored infantry vehicle
GPO	pneumo-hydraulic cleaning for optical systems
KPP	gear
MTLB	multi-purpose light-armored towing truck
OBT	main battle tank
OFS	high-explosive shell
P	machinegun
PAZ	nuclear protection
PZU	anti-aircraft machine gun
PNV	night vision device
PT	anti-tank
PTO	anti-tank gun
PTRK	anti-tank guided weapon
PTUR	anti-tank guided missile
RVD	manual range entry indicator
SAU	self-propelled artillery
SPZ	smoke screening system
SUO	fire control system
UR	guided missile

18. TECHNICAL SUPPORT

Should you experience a technical problem concerning the operation of this product, please contact our technical support staff. Before you call, please read the README.TXT file on the CD to see any last minute recommendations pertinent to your problem.

Also, check out the Support page on our web site listed below. When you call, please be at your computer and have the following information available:

Computer make and model; Windows version; Total system RAM; Total Hard Drive space; Video card make and model

Phone: (514) 844-2433, Mon.-Fri. 9am-5pm

Fax: (514) 844-4337, Attn: Support

Internet e-mail:
For prompt technical support via email, please fill out our online form at

http://www.strategyfirst.com/en/support

For any other technical support questions or concerns, contact us at:

support@strategyfirst.com

Strategy First web site: http://www.strategyfirst.com

19. KEYBOARD SHORTCUTS

All crew positions

Cycle combat stations ..... TAB
Driver station F5
Gunner station F6
Commander station F7
AA machinegun F8
External camera On/Off F9
External camera zoom in/out Num7, Num9
External camera left/right ..... Num4, Num 6
External camera up/down Num8, Num2
External camera in default position Num5
Map On/Off F11
Instrument panel On/Off ..... BackSpace
Headlights On/Off L
GPO (hydraulic pneumatic cleaning) ..... G
Menu ..... Esc
Turn off waypoint indication ..... P
Next/previous waypoint ..... [,]
"Head to waypoint" AI driver command .....
"Stop" AI driver's command 1
"Fire/Hold fire" AI gunner command 2
"Search On/Off" AI commander command 3
"Rotate Gun" AI gunner command 4
"Forward" AI driver command 5
"Reverse" AI driver command 6
"Turn left" AI driver command 7
"Turn right" AI driver command 8
"Turn towards target" AI driver command 9
"Find hull-down position" AI driver command 0
Switching sights next/previous ..... PgUp, PgDown
Open/close hatch ..... LCtrl+H
Screenshot F12

Driver

Fixed throttle / fuel feed ..... Mouse scroll -OR- Up, Down
Throttle ..... X -OR- 1J
Brake ..... Space
Mountain brake ..... On/Off -OR- 5J
Controlling driver levers.
(Lever away from driver - movement,
towards driver - brake)

Right and left buttons –take the corresponding lever.
Mouse movement – lever moves forward/backward -OR- Left, Right
Switch Gears ..... A, Z -OR- Num+, Num-
Horn Signal ..... H -OR- J3
Digging blade up/down (T-72 only) ..... LCtrl+D -OR- J4
Ignition On/Off ..... E -OR- J6
Autotransmission On/Off ..... S

Gunner

Turret left/right ..... X axis with left button pressed -OR- Left, Right
Tank barrel up/ down ..... Y axis with right button pressed -OR- Up, Down
Select ammo type ..... B, N
Load ammo ..... R -OR- J4
Fire gun ..... Space -OR- J1
Fire machinegun ..... Q -OR- J3
SUO (Firecontrol) On/Off ..... S
Range finding ..... R Button -OR- Enter -OR- J5
Adjust reticle illumination ..... X, C
Zoom in/out (sight magnification) ..... Mouse scroll -OR- +, -
Left smoke screen ..... ,
Right smoke screen ..... .
Turn On/Off manual range input (RVD) ..... LCtrl+W
Manual range adjustment ..... U, I

Commander

Left/right turret turn ..... Mouse -OR- Left, Right
Barrel up/down ..... Mouse -OR- Up, Down
Select ammo type ..... B, N
Load ammo ..... R -OR- J4
Fire gun ..... Space -OR- J1
Fire machinegun ..... Q -OR- J3
SUO (Firecontrol) On/Off ..... S
Adjust reticle illumination ..... X, C
Target acquisition ..... T -OR- J6
Zoom in/out (sight magnification) ..... Mouse scroll -OR- +, -
Range finding ("Dual" mode) ..... R Button -OR- Enter -OR- J5
"Dual" mode On/Off ..... D
AI target designation ..... R Button

AA machinegun

Left/right turret turn ..... Mouse -OR- Left/Right
Barrel up/down ..... Mouse -OR- Up, Down
Fire ..... Space -OR- J1

Map

Formation ..... F
Defense ..... D
Mount into/on vehicle I
Dismount ..... O
On/Off road ..... R
Movement ..... M
Speed ..... E
Fire/Hold fire ..... Space
Pause ..... Esc

Statistics/Reference

Screenshot F12
Next vehicle ..... Left
Previous vehicle ..... Right
Information/Statistics ..... Space
Vectors On/Off ..... Tab
Quit ..... Esc
Next vehicle ..... R button
External camera zoom in/out Num7, Num9
External camera left/right ..... Num4, Num 6
External camera up/down Num8, Num2
External camera in default position Num5

20. NOTES